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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Variable Cut Dicer-Slicer

We, FEATURE PRODUCTS, INCORPORATED, a corporation organized and existing under the laws of the State of Illinois, United States of America, of 955 West Washington Street, City of Chicago, County of Cook, State of Illinois, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a variable cut dicer-slicer, for use in the preparation of raw and cooked vegetables, fruits, and other foods. Although the primary contemplated use for the device is in the household kitchen, it will be appreciated, as the following description proceeds, that it has an unusually wide variety of applications commercially.

Dicers, slicers, wedgers and cutters have been heretofore proposed as various separate units. With the home kitchen becoming progressively more mechanized, homemakers are reluctant to give space to single-purpose items. The present device, however, by providing for a unique interrelationship between a pair of parallel blade cutting elements, may be used as a dicer-slicer, multiple-cut slicer, and variable thickness slicer, which will handle, for example, an entire tomato with one push. It can also dice onions into hundreds of small squares, or it can cut carrot sticks, french fries, dice beets, and slice pickles. Many of the slicers which have been heretofore used employ separate pushers, or finger guards, or presuppose that the user will exercise sufficient care and caution to prevent cutting the fingers. With the present device, the pusher is utilized for the cutting operation, thereby holding to the irreducible minimum the possibility of injury to the user, even when large volumes of food are processed.

Additionally, in order to facilitate storage in a compact unit, the device may be provided with a storage lock which serves to lock the pusher in the down position for storage in a kitchenette cabinet when out of use.

One object of the present invention is to provide a variable cut dicer-slicer which will enable the operator, with one or two operational strokes, to multiple-cut whole fruits and vegetables.

A further object of the invention is to provide a variable cut dicer-slicer which, by double processing of foodstuffs, can cut dices, both small and large sizes and in varying shapes, shoestrings, juliennes, and a wide variety of additional cuts.

According to the present invention there is provided a variable cut dicer-slicer comprising a pair of juxtaposed cutting elements each having a plurality of parallel prestressed blades of substantially uniform cross-section, one of said elements being adapted to rotate relative to the other whereby foodstuffs pressed through the cutting elements may be cut into a variety of column configurations by varying the relative angular displacement of the cutting elements to preselected settings.

Preferably a variable cut dicer-slicer comprises a base having an opening at its upper portion, a pusher portion adapted for reciprocating movement relative to the base and locking means adapted preselectedly to secure the pusher in covering relation to the cutting elements.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is a perspective view taken from an elevated location of the dicer and slicer;

Figure 2 is an enlarged top view of the dicer-slicer shown in Figure 1;

Figure 3 is a side view of the dicer and slicer with a pusher top portion set at an angle;

Figure 4 is a front elevation of the dicer and slicer illustrating the location of a potato or similar item of foodstuff prior to slicing;

Figure 5 is a subsequent and sequential view to Figure 4 illustrating how the top of the dicer and slicer is depressed and cuts the food;

Figure 6 is a view on an enlarged scale of the pusher portion of the dicer and slicer taken generally from the elevation shown at section lines 6—6 of Figure 4;

Figure 7 is an enlarged, partially broken, view of the pair of cutting elements illustrating their orientation for cutting thin slices, the phantom lines and perspectively shown slice adjacent the dial representing the potato or similar foodstuff and the portion therefrom cut by the blades in the Figure 7 configuration;

Figure 8 is a similar elevation as Figure 7 but sequentially indicating a different orientation of the two cutting elements for cutting diamond shape sections;

Figure 9 is an elevation similar to Figures 7 and 8 showing the blades oriented for the cutting of the squares or elongate sticks;

Figure 10 is a subsequent and sequential view of the cutting elements shown in Figures 7, 8 and 9 with the blades oriented in juxtaposed parallel relationship in order to cut a thicker slice, exactly twice as thick as that shown in Figure 7;

Figure 11 is an enlarged, partially broken top view of the cutter showing particularly the relationship between the cutting elements and the support taken along section lines 12—12 of Figure 1;

Figure 12 is an enlarged, partially broken, partially diagrammatic, section view of the dicer and slicer shown in Figure 11 and taken along section line 13—13 of Figure 11;

Figure 13 is a perspective, partially exploded view of a cutting element illustrating the relationship between the blade portion and ring support;

Figure 14 is an enlarged, partially broken top elevation of a corner portion of the cutting element shown in figure 13 illustrating the cuts receiving the convoluted blade and the slot for pinning the blade into place;

Figure 15 is an enlarged, exploded, partially perspective and partially broken view of the dicer and slicer showing the assembled relationship between the cutting elements and the base top portion;

Figure 16 shows a series of top elevation views of alternative configurations of the cutting elements with the blades shown in single usage, single loop configuration and double loop configuration;

Figure 17 is a perspective view of an alternative form dicer-slicer showing a variation in the reciprocating support and a reversed relationship between the pusher and cutter;

Figure 18 is a perspective view of an alternative embodiment of the variable-cut food dicer and slicer according to the invention;

Figure 19 is a front elevation on a reduced scale of the food dicer and slicer shown in Figure 18 illustrating a potato positioned on the same for cutting;

Figure 20 is a top view on a reduced scale of the food dicer and slicer shown in Figure 19;

Figure 21 is a front elevation of the food dicer and slicer as shown in Figure 19 with the pusher element in the down position, illustrating diagrammatically how the potato is sliced, and also illustrating the configuration of the food dicer and slicer when the top is locked in the down position for storage;

Figure 22 is a side elevation taken from the right side of Figure 21 showing the pusher in the elevated position and tipped rearwardly to permit the operator to view the foodstuff while positioning the same on the blades for cutting;

Figure 23 is a partially sectioned top view of the cutting elements of the food dicer and slicer taken along section line 24—24 of Figure 18;

Figure 24 is an enlarged partially broken sectional view of the storage locking mechanism taken along section line 25—25 of Figure 21;

Figure 25 is an enlarged, partially broken, partially sectioned view of the locking mechanism taken along section line 26—26 of Figures 24;

Figure 26 is an enlarged, partially broken, sectioned view of the pusher element and spring return mechanism taken along section line 27—27 of Figure 23;

Figure 27 is a partially sectioned, partially broken, partially diagrammatic view of the interrelationship between the pusher top and the upper portion of the base taken along section line 28—28 of Figure 20;

Figure 28 is a front partially broken view of an internal portion of the pusher showing the interlock safety ring of the pusher top;

Figure 29 is a transverse sectional view of the pusher top taken along section line 30—30 of Figure 27;

Figure 30 is an enlarged, partially broken, partially diagrammatic partially sectioned view showing the relationship between the lower cutting element and upper cutting element with the top of the base member;

Figure 31 is an exploded perspective view taken along a cross-section appropriate for illustrating the spring-loaded detent assembly;

Figure 32 is a side cross-sectional view of the spring-loaded detent assembly;

Figure 33 is an enlarged top view of the spring-loaded detent assembly.

Figure 34 is a top view of the top cutting element showing cooperating means engageable with the detent assembly;

Figure 35 is a perspective view of a spring as used in the detent assembly.

Referring to the drawings, and in particular Figures 1 to 17 thereof, the variable cut dicer-

slicer 10 has a base 11 provided with a pusher top portion 12 which reciprocates axially toward a cutter ring assembly 14 which is housed in the base 11 and in a plane perpendicular with that of the motion of the pusher portion 12. The cutting element assembly 14 comprises two cutter rings, 15, 16 with one of the cutter rings (here shown as top cutter ring 15) radially adjustable with relationship to the other (here shown as bottom cutter ring 16). The top cutter ring 15 is made radially adjustable, and provided with a safety interlock mechanism 18 which accomplishes the two-fold purpose of indexing the top cutter ring to the propor location for various cuts and preventing the pusher top portion 12 from fully engaging the cutter blades in interfit relationship unless the proper adjustment has first been made. As will be noted in Figure 3, the pusher top portion 12 is pivotally connected to the base 11 in such a manner that at the initial portion of the downstroke the pusher top portion 12 can be tilted rearwardly in order to provide visual inspection and accurate location of the foodstuffs to be cut by the cutter ring assembly 14 prior to use. Thereafter, the pusher top portion 12 is pivoted over into the cutting position as shown in Figure 1 and pushed downwardly while out of the way of any fingers.

By reference to Figures 7 to 10 it will be seen that a wide variety of relationships between the top cuter ring 15 and bottom cutter ring 16 are contemplated. Next to each of the figures, is a perspective showing of various food cuts that may be achieved with the adjacent cutter ring assembly settings. It will be appreciated, of course, that the food stuffs may be run through the cutter ring assembly 16 two or three times, each time with a preselected angular displacement of the cutter ring assembly. For example, if the Figure 7 cut is made which makes a parallelism of thin slices, and the operator holds his hand beneath and then places the foodstuff, for example a potato, atop the slicer again after turning 90°, the resulting product is a plurality of shoestrings which are ready for French frying or otherwise processing. On the other hand, using the square relationship between the upper cutter blades and the lower cutter blades, as illustrated in Figure 9 once, and the parallel relationship of Fig. 10 once, the operator need process a potato only twice in order to achieve uniform square dices. At least one hundred dices can be cut from the average potato in just two insertions through the unit. In order to give a better illustration of the wide variety of types of cut and work which can be performed by the subject variable cut dicer-slicer, there is tabularized below a listing of the various positions, by a single cut or in combination with a second position on a second or even third cut, and an indication of the results achieved:

	Position	Number of Cuts	Type of Product
1.	Off-set Parallel (Figure 7)	1	Thin slices
		2	Shoe strings
		3	Small dices
2.	90° Top Angle with Fixed Cutter (Fig. 9)	1	Diamond shaped lengths
3.	45° Top Angle with Fixed Cutter (Fig. 8)	1	French fries
4.	Parallel Blades (Figure 10)	1	Thick slices
	1 and 3	1 and 2	Thin diamond dice
	1 and 2	1 and 2	Thin square dice
	4 and 3	1 and 2	Diamond dice
	4 and 2	1 and 2	Square dice
	4 and 1	1 and 2	Rectangular squares

In addition to the foregoing cuts, the following is but a partial list of the type of fruits, vegetables and other foodstuffs which can be processed in accordance with the cutting configurations outlined above:

Thin Slicing	Diamond Dices
Eggs (hard)	Potatoes
Celery	Carrots
Carrots	Beets
Potatoes	Onions
Beets	Celery
Olives (stuffed)	
Boiled Potatoes	
Onions	Square Dices
Bananas	
Strawberries	Potatoes
Peaches	Carrots
Radishes	Beets
Cucumbers	Onions
Pickles	Celery
Okra	
Mushrooms	Small Dices
Garlic	
	Potato
Julienne	Onion
	Carrot
Potatoes	
Carrots	Sea Food
Beets	
Cheese	Shrimp — large slices (cooked)
Chops	
Onions	
French Fries	
Potato	
Egg Plant	
Thick Slicing	
Green beans	Tomatoes
Celery	Cucumbers
Apples	Egg Plant

The foregoing advantageous functions achieved by the subject dicer and slicer will permit a more ready understanding of the significance of the various details of construction. Turning again to Figures 1, 2 and 3, it will be seen that the pusher top portion 12 is generally circular in nature having a central head portion 19 flanked by a pair of hand holds 20. The hand holds 20 are rectangular in nature and permit the operator, upon actuating the unit, to place the thumb of each hand atop each hand hold, or the heel of the hand, and press the pusher top portion 12 downwardly to thrust the foodstuff 21 through the cutter ring assembly 14. The parallel guides 22 are firmly secured at their upper portions to the base of the central head 19. As illustrated in Figure 3, the guides 22 have a pair of grooves 24 near the outer portion of the guide 22 as well as on the inner portion of the guide 22. Pins or extensions 25 (See Figure 13) engage in the grooves and restrict the central head 19 to a downward stroke when depressed by the operator.

A guide pivot pin 26 on either side of the base fixes the guide 22 permanently to the base 11. The pivot-pin 26 rests within the pivot pin slot 28 in the centre of the guides 22 and abuts against the coil-return spring 29. The forward portion of the base of the guide 30 is rounded in order to accommodate the guide 22 into the retracted position shown in

Figure 3 in order to facilitate placing the foodstuff 21 into position for cutting. Guide rails 31 (See Figure 12) within the base 11 provide a channel into which the guides 22 are directed for their downward stroke. While the base 11 is generally semi-cylindrical in configuration, a pair of forwardly extending feet 32 may be provided in order to insure stability on a counter top 34 such as illustrated in Figure 3.

A circular support portion formed at the upper end of base 11, and provided with a central open area 36 has a stepped shoulder 38 (See Figure 12) which receives and holds the cutter ring assembly 14. The bottom ring 16 (See Figure 13) is provided with offset locking lugs 39 which insure proper orientation through their engagement with locking slots 40 (See Figure 11). A locking ball recess 43 is provided in the bottom ring 16 so that it may be correctly located when it is inserted in the base 11. Ease of relative rotation between the top and bottom ring is enhanced by index ribs 23 on the upper surface of the top ring 15 and a slip ring rib 37 on the bottom of top ring 15 for easy sliding contact with bottom ring 16.

In order to selectively position the upper ring 15 relative to the lower ring 16 to provide the various relationships as illustrated in Figures 7, 8, 9 and 10, a spring-loaded ball 41 (See Figure 15) is held in place at the end of the hollow index rivet 27 and yieldably urged toward the detents 45 in the periphery of the upper ring 15 by means of the spring 42 within the hollow body of the hollow index rivet 27. The end 44 of the hollow rivet 27 is crimped in order to retain the ball 41 in position. It will be appreciated that the other alternative interlocking constructions, for example, a spring-loaded ball within the upper ring engaging a detent in the lower ring could also be utilized for this purpose. As will be observed in Figure 15, suitable numerical indicia 46 are provided in the upper ring 15 to enable rotation of the upper ring 15 to the preselected relationships between the detents 45 and the locking ball 41 which achieves the orientation indicated in Figures 7 and 10.

Figures 13 and 14 disclose more completely the structural relationship between the ring (here shown as lower ring 16), and the convoluted blade assembly 50. As seen in Figure 14, a plurality of blade-mounting pins 48 in the ring 16 adjacent its central open portion are defined by semi-circular blade slots 49. The pins 48 are positioned in opposed staggered relationship so that the convolutions of the blade assembly 50, when the curved end portions 51 thereof are placed within the blade slots 49 define a plurality of individual parallel blade portions 52. A blade-end mounting slot 54 is provided at positions flanking the blade-mounting pins 48. The ends of the blade are preferably finished with a knurl 56. A plurality of notches or a crimp may also be used, however, in lieu of the knurl 56. When the knurl 56 is fitted within the slot 54, a metal wedge 55 is then driven into the slot 54 and deformingly engages the knurl 56 whereby the ends of the blade assembly 50 are secured to the ring. While the metal for holding the knurl is preferably a deformed portion of a rib 55 adjacent the slot 54, a separate metal wedge may also be driven into the slot.

Because the blade assemblies 50 are prestressed to an unusual degree, the pusher top portion 12 is provided with a specially adapted pusher member 58 which has a plurality of extending projections 59 prescribing the general pattern exhibited in Figure 6. There it will be seen that a plurality of blade channels 60 are defined by the edges of the extending projections 59 which parallel the configuration of the individual blades 52 in the various configurations shown in Figures 7, 8, 9 and 10. The construction is such that upon depressing the pusher top portion 12, the extending projections 59 flank the cutting edge of the upper parallel cutting blades 52. While this does not necessarily insure the complete passage of the foodstuff through the entire cutter ring assembly 14, the operator can grasp the partially sliced foodstuff 21 from a position slightly above that level shown in dotted lines in Figure 5 and pull it through. The advantage of this " hanging by a thread " will be readily understood when, for example, diced potatoes are to be made. Further, it will be seen that diagonal channels meeting at a wedge cut centre 61 are provided to accommodate the blades 66 of the wedge cutter. The thin slice channels 63 are only at one 90° displacement from the full cut channels 67 thereby providing a maximum surface area on the extending projections 59 for pushing the food through the blades.

In accordance with the tabulation shown above, the upper ring 15 and lower ring 16 are oriented into a position where the upper and lower blades are in a vertical plane as in Figure 10. The potato is then pushed downwardly through the cutter ring assembly 14 and the cut is similar to that shown in Figure 5. The operator then holds the entire potato even though sliced, and inverts it 90° and places it atop the cutter ring assembly 14 after first having reoriented the blade assembly into the configuration illustrated in Figure 9 where the upper and lower parallel blades are at 90° angles with each other. Then, when the already laterally sliced potato is pushed thereto, a plurality of dices results. As pointed out above, the average potato will be cut into at least 100 dices in this manner. Similarly, beets and other vegetables can be diced for cooking.

In order to assist the operator and further ensure the safe operation of the unit without risk of damaging the blades by engagement with the extending projections 59 on the pusher member 58, a safety interlock projection 18

is provided which extends upwardly from the cutter ring 15. The interlock projection 18 prevents the central head 19 from descending its fall stroke unless the projection 18 is aligned with one of the pockets 17 in the pusher head (one pocket only being shown in Fig. 2). As the upper ring 15 is rotated to the various stations as indicated by the numerical indices 46 (or other marking indicia) which may be based on the outer ring of the circular support portion 35 of the base 11, and the spring-loaded locking member 41 engages the spaced detents 45 on the upper ring 15 the projection 18 will readily nest within one of the pockets 17 in the central head 19. In the event, however, that the channels 60 of the pusher member 58 would not be properly lined up and thus invite damage to the blades 52 by contact with the lower ends of the extending projections 59, the upper portion of the interlock projection 18 would abut the lower rim of the central head 19 and prevent the extending projection 59 from contacting the parallel blades 52.

The blades must be prestressed prior to securing in place. With a 10/1000 inch blade 80/1000" wide, a prestressing in the range of 100 to 200 pounds per blade will permit satisfactory cutting. A stainless clock spring steel produces excellent results. If the blades are not sufficiently prestressed, jamming occurs and the force required to cut the foodstuffs becomes excessive. In the event the blades are prestressed excessively, the cutter rings may be distorted, and although the blades will cut satisfactorily, their life expectancy will be shortened. Thus, the prestressing the blades to a point which permits easy passage of food is critical. The degree of prestressing for various blades can be determined and checked by plucking the blades and checking their pitch. For example, the pitch of a 60/1000 inch blade 10/1000 inch of blued carbon steel should be at least 2400 cycles per second (cps) and for best results not in excess of 3200 cps. The stainless clock spring steel behaves similarly.

While the foregoing description of the blades and cutter rings show a technique for employing a continuous-type blade, alternative constructions are contemplated such as those shown in Figure 16. In Figure 16 (a) a configuration is shown wherein single blades 52 are contemplated. Each of the blades has an end construction similar to that illustrated in Figure 13 with a knurl for anchoring within the slot 54. The configuration shown in Figure 16(b) contemplates a plurality of single loop blades 52, pairs of the ends of which are provided for wedging into position at opposed stations defined by slot 54 within the ring. Still another alternative configuration with a double loop blade and locking slots at opposed portions of the ring is shown in Figure 16(c). There it will be seen that the recessed crescent members 48 are provided as illustrated in Figure 14 with opposed staggered slot portions 54 in order to stake the double-looped blades into position.

As shown in Figure 18, by reversing the cutter ring assembly and pusher, an alternative form dicer-slicer 80 may be produced. A handle 81 is fixed to the movable cutter ring assembly 82 which reciprocates along a single support post 84. The foodstuffs are supported on a stripper head 85 on a support 86 which, in turn, is fixed to the stand 88 which supports the post 84. The cutter blades 89 are then advanced toward the grooves in the stripper head 85 as contrasted with the first embodiment. The other interrelated elements are similarly transposed.

To prevent a loss of tension in the blades after they have been assembled within the rings 15, 16, provision may be made for reinforcing the ring construction. As shown in Figures 10 and 16(a), slots 71 are provided parallel with the blades and alongside the central openings of the rings. The slots are subsequently filled with steel reinforcing rods 72 which are prepared slightly oversize and press-fitted into the slots 71. The rods 72 then serve to strengthen the rings 15, 16 at their four corners, which are critical stress points, and prevent a slow loss of tension in the blades 52 due to a pressure deformation of the ring 15, 16.

The alternative embodiment of the variable cut dicer-slicer 100, as shown in Figures 18—22 utilizes a pusher member 112 with a pair of flanking hand grips 120 and a central head portion 119. A pair of guides 122 extend downwardly from the hand grips 120. The guides 122 are yieldably and slideably supported within the base 111 in a manner to be described hereinafter. As will be noted from Figures 18 and 19, the base comprises an outer shell 113 and inner side walls 114 thereby defining a tunnel-like opening 117 to receive cutting dishes and the like into which the foodstuffs 121 fall after being cut. A cutter ring assembly, supported in the top 139 of the base as in the other embodiments, is provided with a top ring 115 and a bottom ring 116, (Figure 30), each of the rings having a plurality of parallel blades 152. The parallel blades 152 are engaged by the extending projections 159 beneath the lower portion 158 of the pusher member 112.

Referring now to Figures 24 and 25, it will be seen that a unique locking assembly 130 has been provided. The lock comprises a handle 131 having an interior shaft portion 132. The interior shaft portion 132 has a roughened tapered face 133 which engages a notch 134 in the guide 122. A snap ring 135 secures the shaft from lateral disengagement by abutting the periphery of the lock slot 136 in the outer portion of shell 113 of the base 111. Thus when the dicer-slicer is to be placed

out of use, the pusher 112 is lowered to the position shown in Figure 21, and the handle 131 of the locking assembly 130 is moved forwardly whereupon the shaft 132 engages the locking notch 134. In this configuration the dicer-slicer takes up the least cupboard space, and additionally the pusher top extensions 159 are clearly engaged in a guarding relationship with the parallel blades 152. Thus a two-fold purpose is accomplished by reducing the size of the unit for storage, and protecting the blades from any damage which could occur from falling objects in a kitchen cupboard and the like.

The structure for receiving the guides 122 of the pusher 112 is best illustrated in Figure 26. It is seen that a guide rail 127 is provided at a portion in the wall of the base along with a web 137 which contains the pivot pin slot 128. By providing a longitudinal slit 129 (See Figure 23) in the rear of the guide 122, the side portions of the guide 122 can be squeezed together to permit the pivot pin 126 to fit within the guide slots 138 and thereafter, upon releasing, the pivot pin 126 extends into the pivot pin slot 128.

The V-shaped forward extension 140 of the guides 122 has a return spring shoulder 141 at its lower end which rests atop the return spring cap 142. A stud 143 extends downwardly from the return spring cap 142 and nests within the central portion of the return spring 125 thereby serving to transmit the upward force of the return spring 125 onto the guide 122. An angled support shoulder 144 extends from the upper portion of the rail 127 and provides an abutting surface for the guide 122 when it is tilted rearwardly into the configuration shown in Figure 23. As shown in Figures 24 and 26 the return spring 125 abuts forwardly against the wall 145, and is contained in the opposite direction by means of ribs 147. Thus in assembly, the return spring 125 is placed into postion and snapped through the ribs 147 until it approximates the wall 145. Thereafter the return spring cap 142 is placed into position, and the return spring base socket 149 is force-fitted into position and held in place by means of the base socket barbs 148.

The top ring is rotated in much the same manner as the other embodiments heretofore discussed, and the relationship between the blades 152 of the upper ring 115 and those of the lower ring 116 are substantially the same. A spring-loaded detent assembly 160 (See Figure 31) is adapted as will be explained in greater detail hereinafter so that when the various indicia 146 are positioned appropriately at the front portion of the unit as indicated by the lower ring locking lug 139, the cuts in accordance with the pretermined usage may be achieved.

A safety ring 151 is provided in the head 119 to prevent damaging the parallel blades 152 by means of pushing the top pusher element 112 too far downwardly. In Figures 27 to 29, it will be seen that the safety locking lug 118 on the upper ring 115 is proportioned to engage a plurality of locking slots 150 in the safety ring 151 which depends peripherally from the pusher central head 119. In this manner, the slot bases 153 defined between the downwardly extending projections 159 are prevented from engaging the blades 152.

In Figure 31 is seen an exploded cross-sectional detail of the spring-loaded detent assembly 160 and the manner of mounting the same on the top 139 of the base member 111. The detent assembly includes a pin 162 that is urged by a flat spring 164 (Figure 33) into engagement with a pin recess 166 that is disposed in a vertical face of the ring 115. Preferably, a plurality of such recesses is disposed peripherally around the vertical face of the ring 115 in the fashion illustrated in Figure 34. The pin 162 has a rounded end to facilitate its sliding in and out of the pin recesses during indexing. The pin 162 corresponds to and is an alternative embodiment of the index rivet 27 of Figure 15. The spring 164 is disposed between the inner wall 170 of the base 139 (the wall that faces the vertical periphery of the ring 115) and an intermediate vertically depending wall 172. The pin 162 passes through a plurality of holes in the base top 139, all of the holes being linearly aligned and there being one each in the walls 170, 172 and the outer wall 174 of the base top 139.

The spring 164 comprises a spring body member 176 with a pair of mutually inwardly facing, outwardly struck central tabs 178, 179. The tabs are so struck as to provide a central space therebetween, whereby the pin 162 passes between the tabs and is resiliently firmly engaged thereby. The spring body is preferably bowed and the entire spring 164 is mounted between the inner and intermediate walls 170 and 172. The mounting is in such fashion as to continuously urge the pin 162 inwardly, whereby it is continuously urged into that one of the recesses 166 which is presented to the pin. In this fashion the pin supports the spring to give a positive means for preventing the spring from falling out from between walls 170 and 172. This, of course, is because the pin passes between the ends of the struck out resilient tabs 178, 179. Moreover, the resiliency of the spring itself is such as to provide a resilient frictional engagement between the spring and the walls 170, 172 between which it is located.

As seen in Figure 33, the spring 164 is bowed by the ends thereof being urged together continuously by engagement with the end walls 180, 181 which extend between the respective ends of the short intermediate wall 172 and the opposed portions of the inner wall 170. The head of the pin 162 is preferably formed with its under side sloped for appropriately

and smoothly engaging the outer periphery of the wall 174.

As mentioned above with respect to Figures 13 and 14, the blade portions 152 (or their corresponding members in Figures 13 and 14 —element 52) are secured in the ring 115. A similar construction applies to the ring 116.

The opening across which the blades 152 are disposed may be eccentrically disposed relative to the outside of the ring 115. The reason for this eccentricity is to permit the further obtention of thick slices, thin slices and other such variations by a rotation of the ring 115 to a proper positon, and detention of the ring thereat by the detent assembly 160. For example, suppose thick slices are desired. A convoluted cutter is selected and is positioned with the blades thereof parallel to and vertically aligned with those on the lower cutter 116. The vegetable is then pushed through the cutters and thick slices are obtained. Suppose, however, that thin slices are desired. In such case the ring 115 (or 15, it being a corresponding element) is rotated 180°, whereby the straight portions with the convolutions are parallel to those on the lower ring 16 (or 116), but are not in alignment therewith. In this fashion, thin slices approximately one-half the thickness of the distance between the adjacent portions of the convolution, are obtained.

In review it will be seen that the alternative embodiment retains all of the features of the first embodiment, and adds the additional features of a lock to simultaneously reduce the size of the dicer-slicer for storage, and to protect the blades 152 when out of use. Additionally, the assembly of the guides 122 within the base member, and their cooperation with the coil spring has been simplified from a cost standpoint, and yet a durable construction has been achieved. The provision of an angled support 144 to hold the guides 122 in a rearward position for starting also improves the construction and strength of the unit. A safety interlock has further been provided to prevent damage to the blades when operated by an over-zealous user.

WHAT WE CLAIM IS:—

1. A variable cut dicer-slicer comprising a pair of juxtaposed cutting elements each having a plurality of parallel prestressed blades of substantially uniform cross-section, one of said elements being adapted to rotate relative to the other whereby foodstuffs pressed through the cutting elements may be cut into a variety of column configurations by varying the relative angular displacement of the cutting elements to preselected settings.

2. A variable cut dicer-slicer according to claim 1 comprising a base having an opening at its upper portion, a pusher portion adapted for reciprocating movement relative to the base and locking means adapted preselectedly to secure the pusher in covering relation to the cutting elements.

3. A variable cut dicer-slicer according to claim 1 or 2, wherein each cutting element is disposed in a central open portion of a frame and provided with crescent shaped pins at opposed staggered stations defining crescent shaped blade slots, and a plurality of ribbon-like blades threaded through the blade slots thereby providing parallel blades traversing the open central portion of each frame.

4. A variable cut dicer-slicer according to claim 2 or 3 including a plurality of projections defining blade channels therebetween extending from the pusher toward the cutting elements.

5. A variable cut dicer-slicer according to any one of claims 2 to 4 comprising a shoulder in the base opening, a head on said pusher portion having projection receiving pockets on its lower portion, a pusher member having blade passages therethrough fixed beneath said head and a guide extending downwardly from said head.

6. A variable cut dicer-slicer according to claim 5 wherein means is provided for locking the bottom cutting element against rotation relative to said shoulder, the top cutting element being free to rotate against said shoulder, and radial spacing means interacts the top ring to fix the top ring with relation to the bottom ring at preselected radially spaced stations.

7. A dicer-slicer according to claim 5 or 6 including a pusher spring return assembly comprising a notch at the base of the guide member, a spring retaining channel having a rib at its open end, a coil spring insertable in said chanel and retained therein by the rib, a spring cap having a depending extension to engage the inner portion of the coil spring, and a base member at the lower portion retaining the spring at its lower end against the compression thereof when the guide notch engages the spring cap and depresses the same.

8. A dicer-slicer according to any one of claims 2 to 7 including a pusher guide and spring assembly comprising a hollow guide leg with side walls defining a longitudinal slit therein, a pivot pin, a guide channel in the base having a pivot pin slot, the length of said pivot pin and longitudinal slit and the resiliency of the guide side walls being co-ordinated to permit closing of the slit and whereby, upon the reopening of the slit, the pivot pin engages the guide channel slot.

9. In or for a variable cut dicer-slicer, according to any one of the preceding claims, a cutting element comprising a frame, said frame having a central opening, means defining blade mounting slots along opposed edges of the central opening, a plurality of blades fixed within the mounting slots, the blades being prestressed.

10. A cutting element according to claim 9 wherein the blades are prestressed to a loading of at least 100 pounds per blade.

11. A cutting element according to claim

along opposed edges of the opening, a ribbon like blade threaded between the opposed pins to define a plurality of parallel blades, and means securing the ends of said blade in the ring.

12. In or for a variable cut dicer-slicer according to claim 9 a cutting element comprising a ring, said ring defining a central open portion, a plurality of alternately opposed blade mounting pins flanking the central open portion of the ring, thereby presenting opposed mounting stations, a single continuous convoluted ribbon-like blade passing in intimate prestressed fit over the mounting pins thereby presenting a pluraltiy of parallel cutting elements, a pair of mounting slots flanking the mounting stations and means for fixing the blade ends in the mounting slots.

13. A cutting element according to claim 12 wherein the mounting pins are of a crescent shape.

14. A cutting element according to claim 12 wherein the means for locking the blade ends in the mounting slots comprises interacting deformable means adopted to maintain a prestressed condition in the blade within the ring.

15. A cutting element according to claim 12, wherein the blade is prestressed to at least half of its maximum tensile strength.

16. A cutting element according to claim 14 wherein a pair of wedges are provided for deformingly locking the blade ends into the mounting slots.

17. A cutting element according to claim 14 wherein the blade ends are dimped to augment the deformable locking action.

18. A variable cut dicer-slicer substantially as herein described with reference to Figs. 1 to 16, Fig. 17 or Figs. 18—35 of the accompanying drawings.

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Fig. 1.

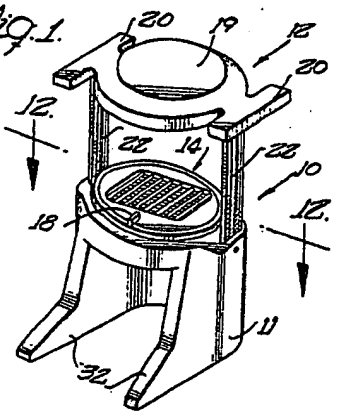


Fig. 2.

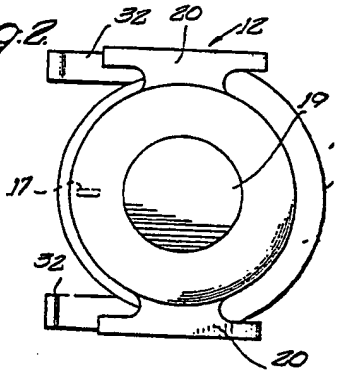
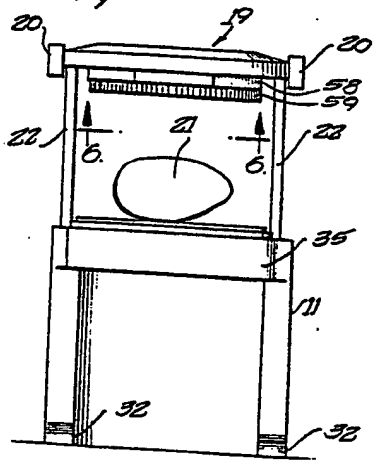


Fig. 4



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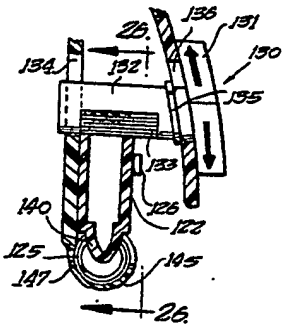

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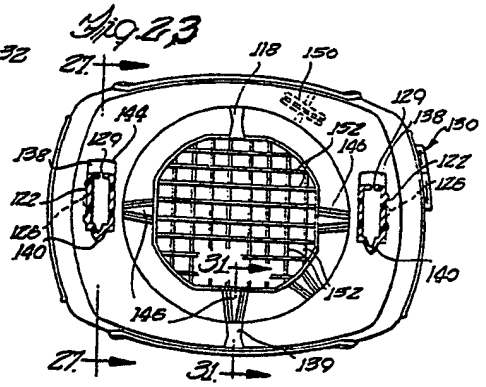

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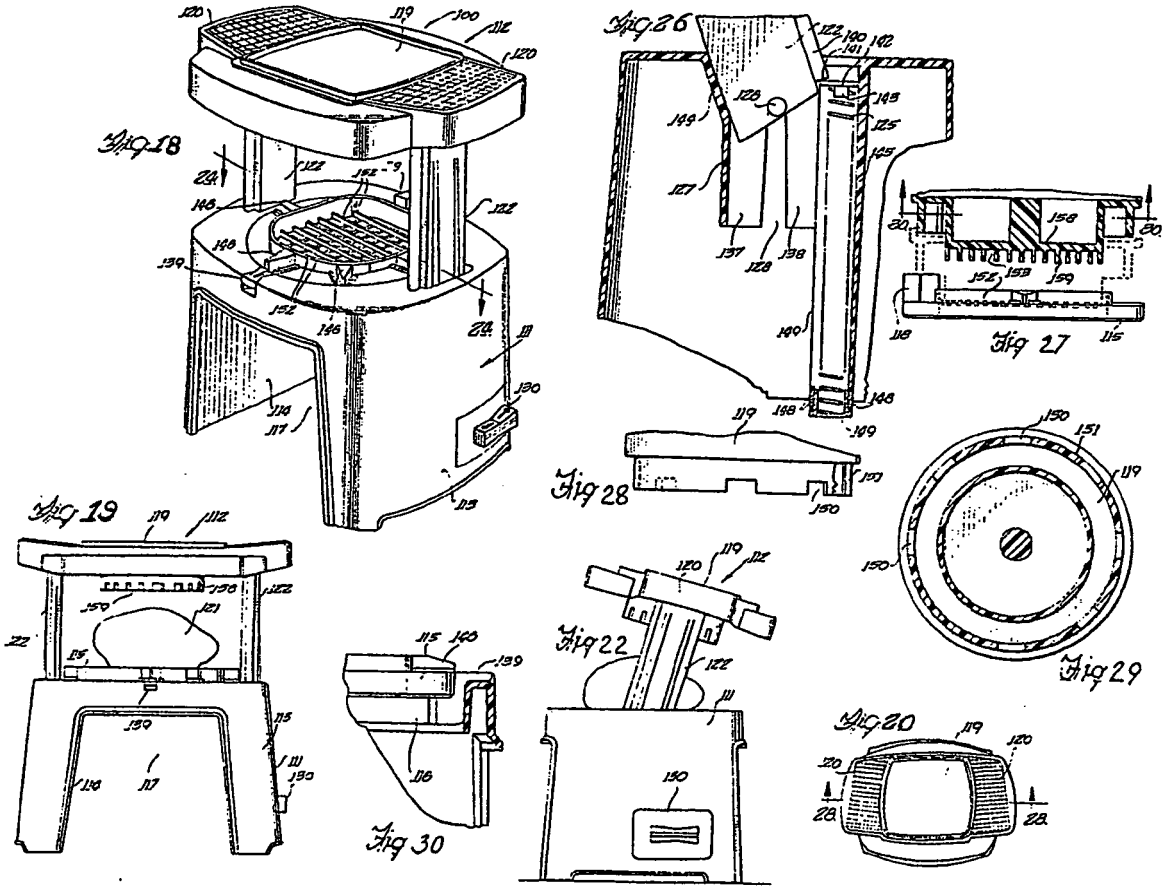

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Fig.31

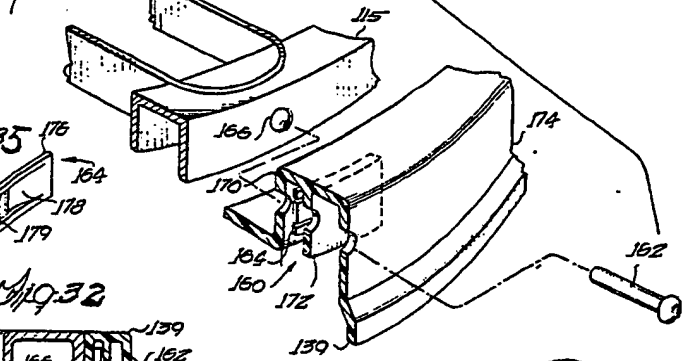
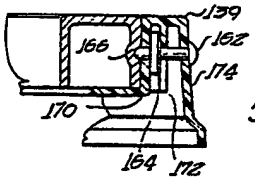


Fig.35

Fig.32



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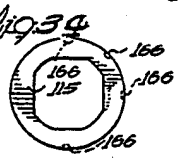

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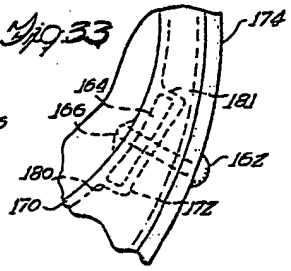

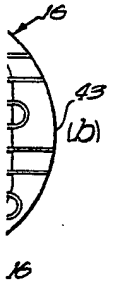

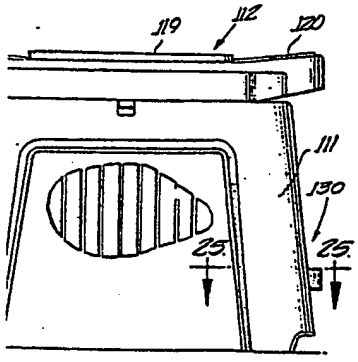

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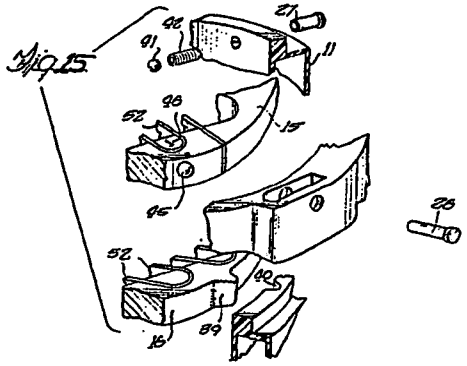
Fig 25.



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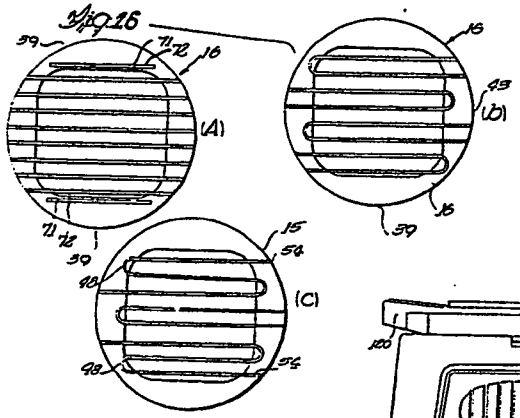

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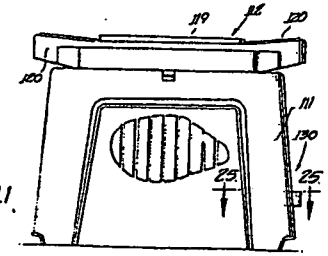

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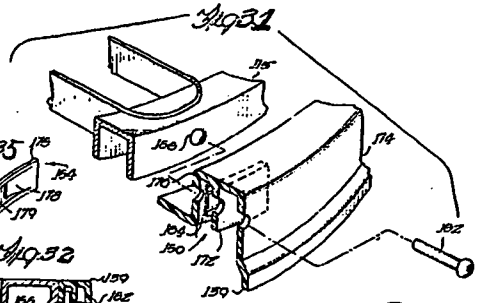
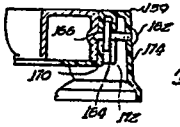


Fig 35.

Fig 32.



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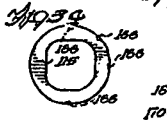

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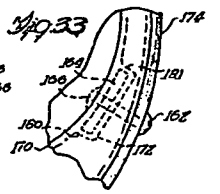

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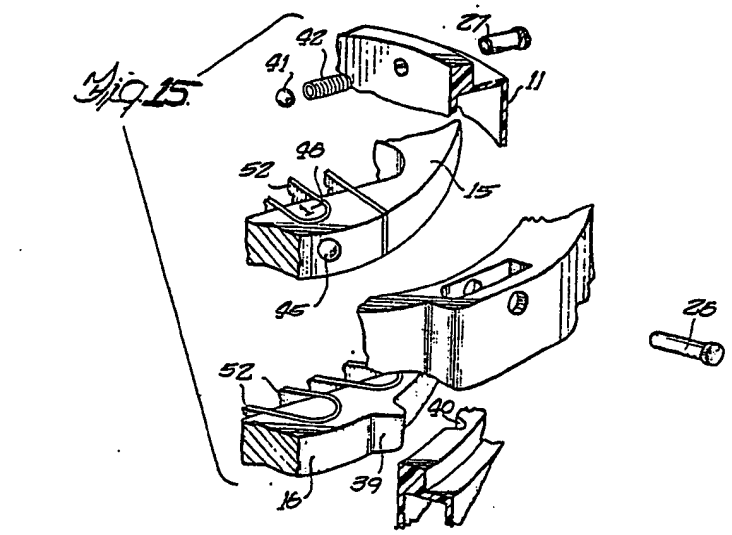

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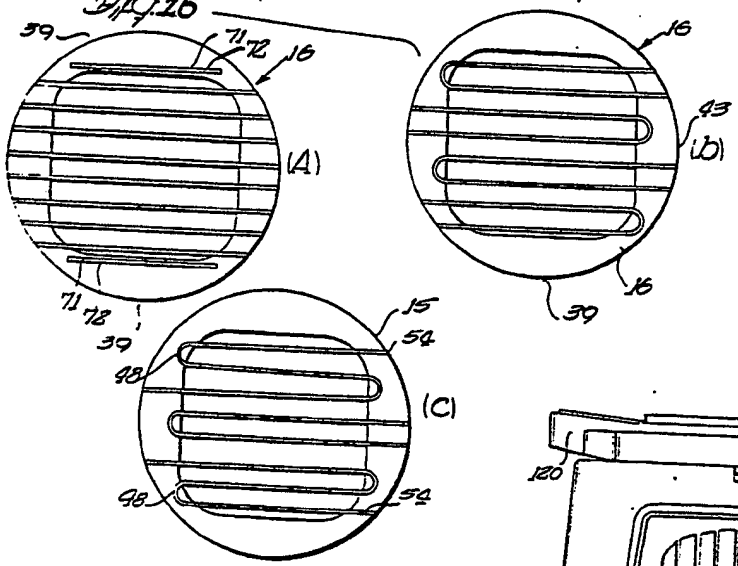

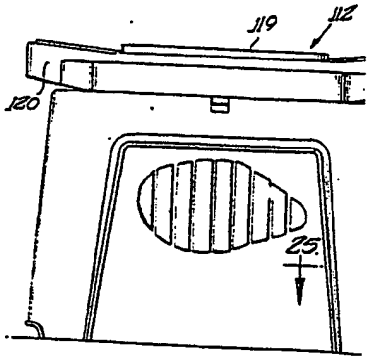

Fig 21

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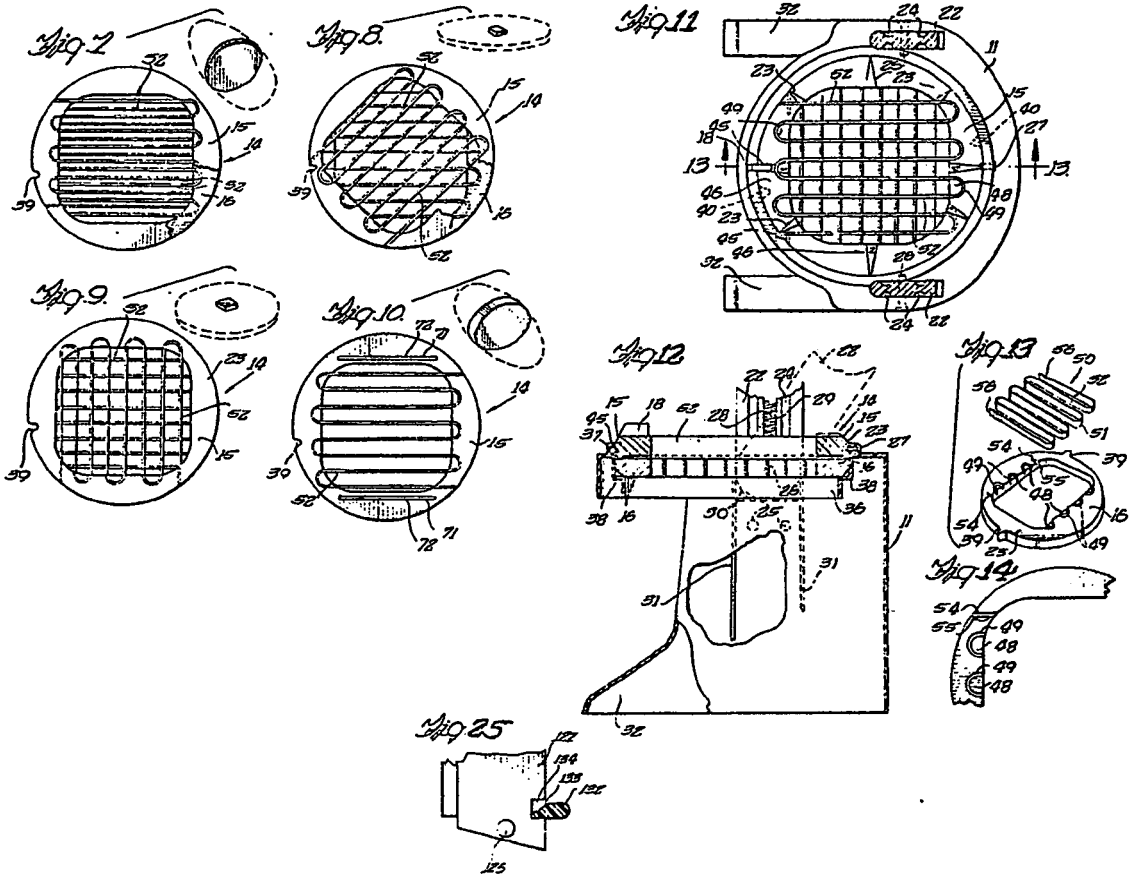

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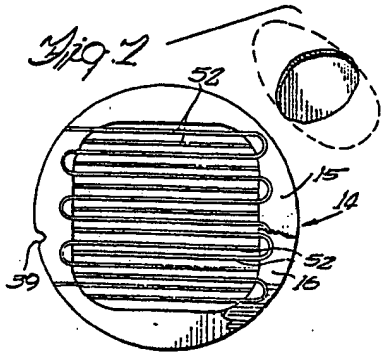

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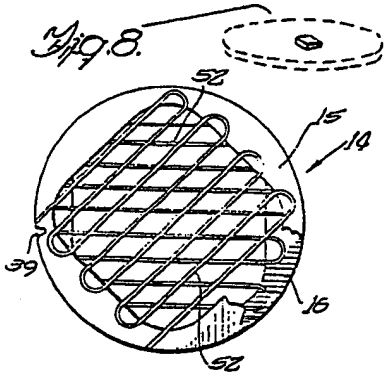

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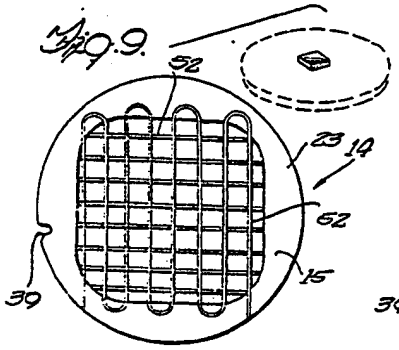

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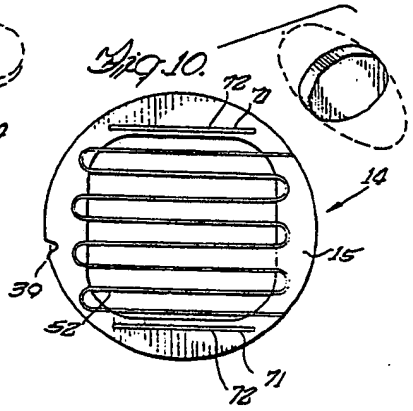

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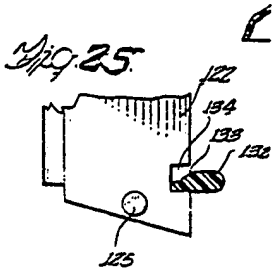

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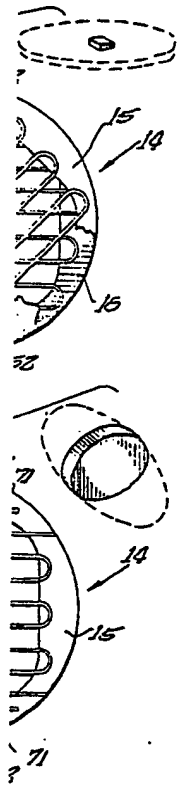

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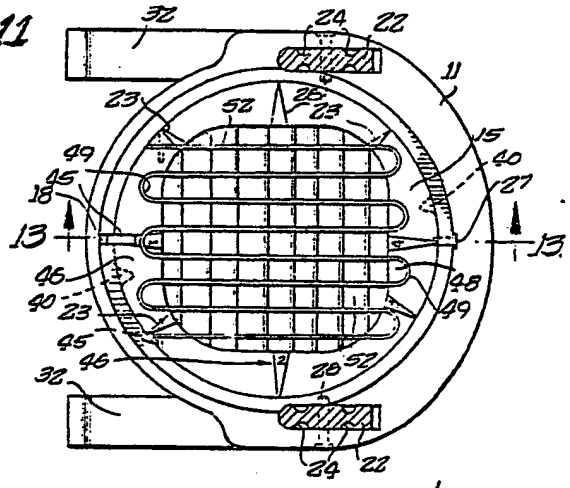

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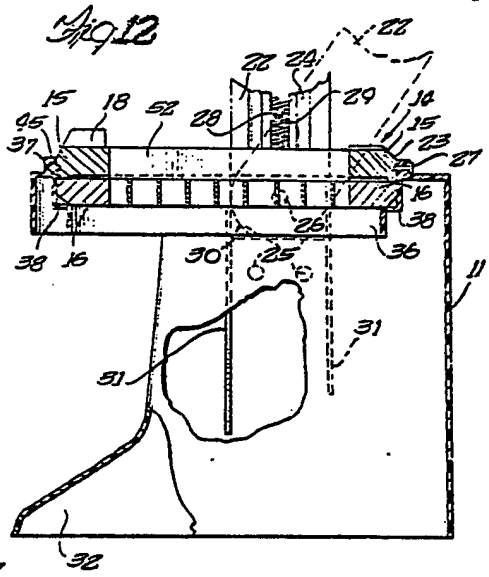

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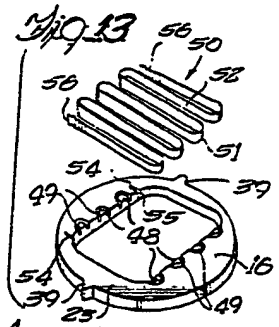

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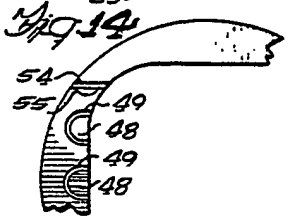

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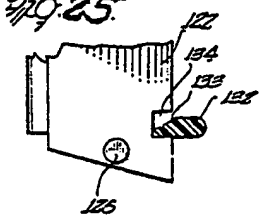

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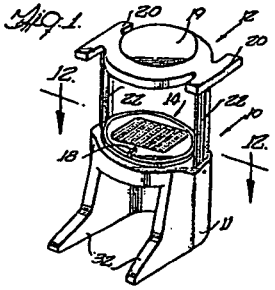

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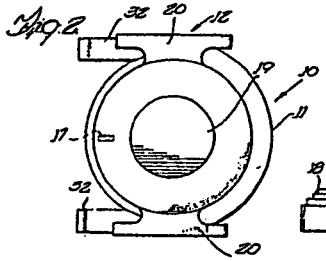

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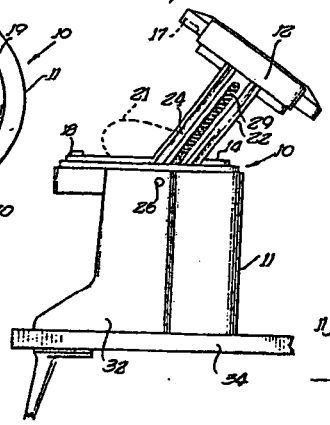

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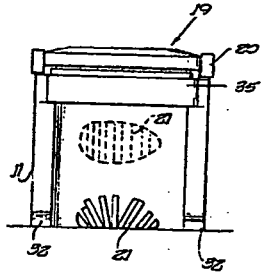

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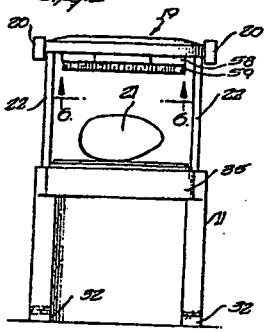

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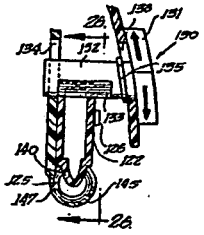

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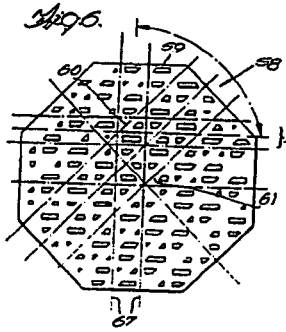

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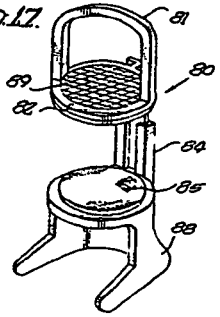

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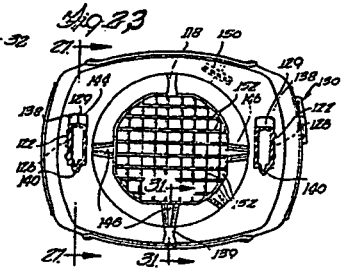

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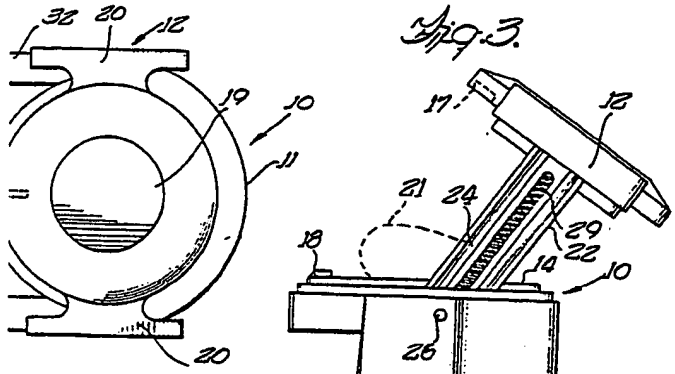

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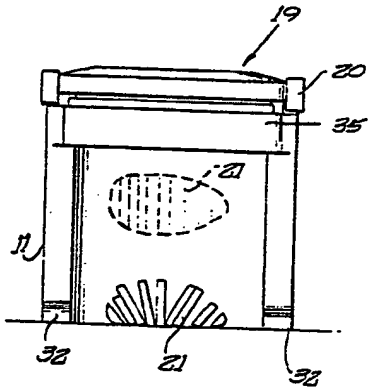

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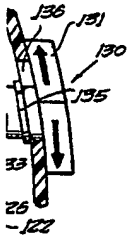

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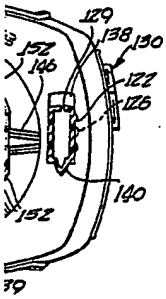

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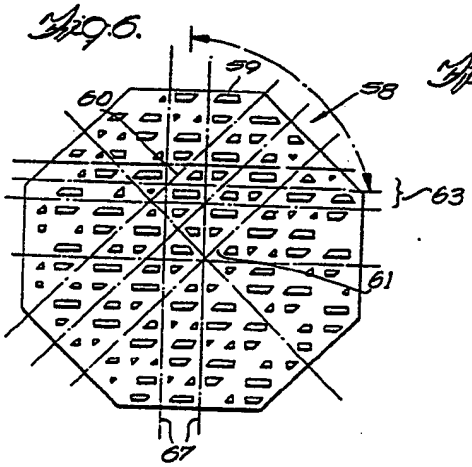

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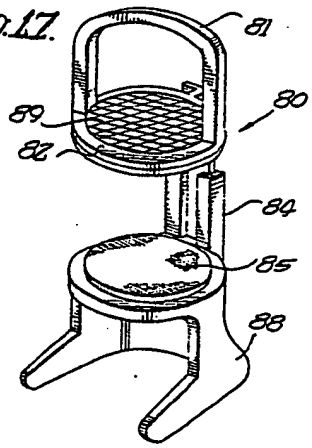

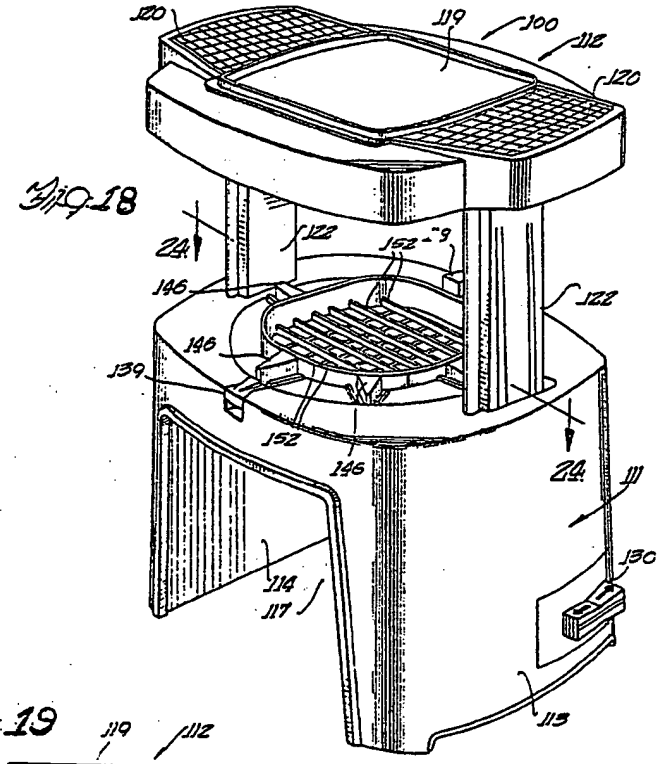

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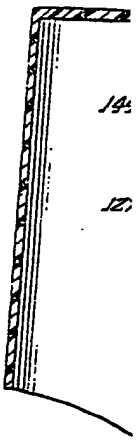

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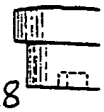

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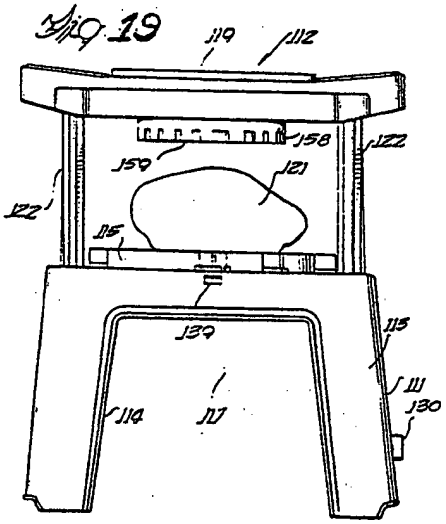

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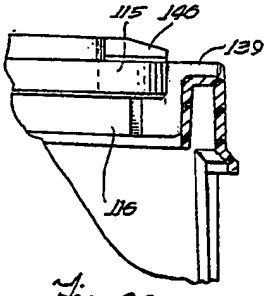

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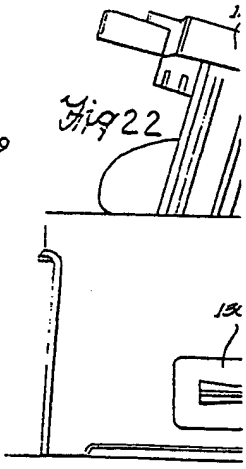

Fig 22

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